BeCasso: Image Stylization by Interactive Oil Paint Filtering on Mobile Devices
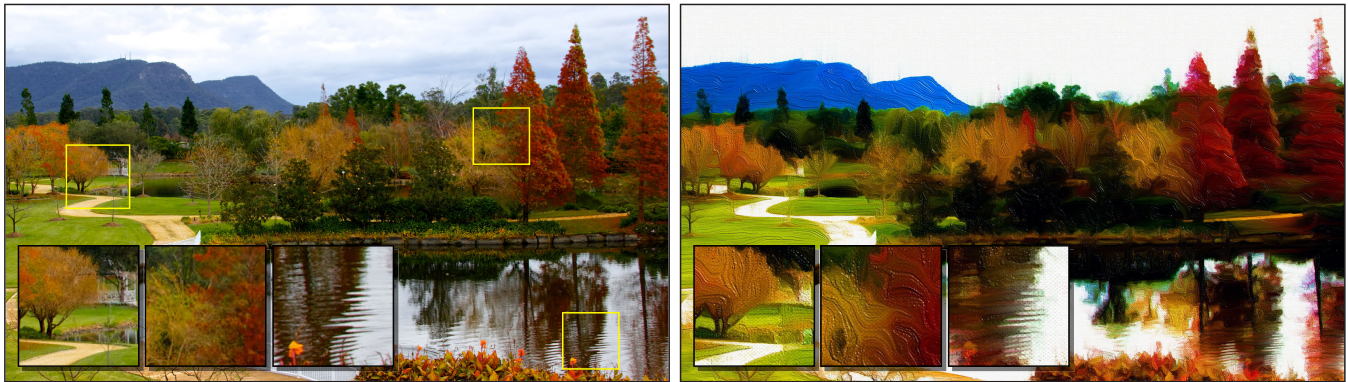
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Figure 1: *A result interactively produced with our mobile app for an input image with a resolution of* $2,560 \times 1,800$ *pixels (left). The stylized output (right) is based on real-time color grading, multi-stage flow-based nonlinear filtering, and a paint texture synthesis.*

Abstract

BeCasso is a mobile app that enables users to transform photos into an oil paint look that is inspired by traditional painting elements. In contrast to stroke-based approaches, the app uses state-of-the-art nonlinear image filtering techniques based on smoothed structure information to interactively synthesize oil paint renderings with soft color transitions. BeCasso empowers users to easily create aesthetic oil paint renderings by implementing a two-fold strategy. First, it provides parameter presets that may serve as a starting point for a custom stylization based on global parameter adjustments. Second, it introduces a novel interaction approach that operates within the parameter spaces of the stylization effect to facilitate creative control over the visual output: on-screen painting enables users to locally adjust the appearance in image regions, e.g., to vary the level of abstraction, brush and stroke direction. This way, the app provides tools for both higher-level interaction and low-level control [Isenberg 2016] to serve the different needs of non-experts and digital artists.

Keywords: mobile, image filtering, stylization, interaction, GPU

Concepts: •**Computing methodologies → Image manipulation;**

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1 Technical Approach

Image stylization enjoys a growing popularity on mobile devices to foster casual creativity [Winnemöller 2013]. However, the provision of high-quality image effects for artistic rendering is still faced by the inherent limitations of mobile graphics hardware such as computing power and memory resources. In particular, the interactive processing of high-resolution image data becomes an increasingly challenging task for image-based artistic rendering that requires several passes of (non-)linear filtering.

This work presents *BeCasso*, a mobile app based on the oil paint effect of [Semmo et al. 2016] that provides several enhancements to achieve the objective of an interactive image processing: (1) real-time color grading using lookup tables [Selan 2004] is employed to simulate rendering with a reduced color palette, (2) a multi-scale approach is used that processes images on downsampled versions and performs joint bilateral upsampling [Kopf et al. 2007] to achieve deliberate levels of abstraction at interactive frame rates, and (3) a graph of the processing chains is maintained to dynamically trigger only invalidated filtering stages. These enhancements significantly facilitate the implementation of interactive tools that can adjust the filtering effects at run-time—a contemporary field of research [Isenberg 2016]—which is demonstrated by an on-screen painting interface for per-pixel parameterization, e.g., to locally vary the level of abstraction, brush and stroke direction.

References

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